



Comhairle Contae South Dublin
Átha Cliath Theas County Council

SPECIFICATIONS OR EXTERIOR PITCH LIGHTING AND PROPOSED STANDARDS & REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

- A. Work covered by this section of the specifications shall conform to the contract documents, drawings & specifications, Building Regulations and Planning Permission conditions.
- B. The purpose of this specification is to define the lighting system performance and design standards for Tallaght Stadium. The manufacturer / contractor shall supply and install a lighting system to meet or exceed the standards set forth in these specifications.
- C. The sports lighting will be for the following pitch: Main Playing Pitch – 105m x 68m
- D. The primary goals of this sports lighting project are:

1. **Guaranteed Light Levels:** Selection of appropriate light levels impacts the safety of the players, the requirements of television broadcasters, and the enjoyment of spectators. Therefore, light levels shall be guaranteed by the manufacturer not to fall below the specified target values for the applicable warranty period.
2. **Environmental Light Control:** It is the primary goal of this project to minimise spill light to adjoining properties and glare to the players, spectators and public areas. The conditions of the approved planning application for this development must be maintained with the new LED system installation.
3. **Scope:** The existing Metal Halide system is end of life and is to be replaced with LED sports lighting. There are 4 no. 36.6m existing columns which are to be retained and reused, with existing electrical infrastructure requiring further evaluation on what can remain and what should be replaced with electrical safety standards. The redundant equipment is to be removed and disposed of by the Contractor including luminaires, crossarms, control gear, wiring etc.

The maximum permissible headframe weight and EPA of equipment fitted to the top of the existing columns must not exceed that of the currently installed lighting system – existing weights and windages are provided in this document and the Contractor is responsible to demonstrate compliance.

Phase 1 and Phase 2 lighting performance must be achieved with the use of existing columns alone.

The Contractor shall provide all equipment, cabling, bracketry, switchgear and associated components necessary for the proposed lighting system to achieve the specified performance requirements.

The Contractor **should** undertake a site visit and satisfy themselves as to the existing site conditions and infrastructure relevant to their proposed solution. The tender submission shall include all works necessary to provide a complete and compliant system.

4. **Life-cycle Cost:** The preferred lighting system shall be energy efficient and cost effective to operate. A 10 Year life cycle cost calculation must be provided by the tenderers. All maintenance costs shall be covered for the duration of the applicable warranty period.

1.2 LIGHTING PERFORMANCE

- A. **Illumination Levels and Design Factors:** Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate maintenance factors shall be applied and submitted based on the specified operating hours and the expected 25 year operational life of the lighting system. The specified lighting performance criteria shall be guaranteed for the applicable warranty periods specified in Section 3.2 (Page 9).
- B. **Phase 1:** Average illumination level shall be measured in accordance with the requirements shown below. A main camera gantry is located under the East Stand canopy.
- C. **Phase 2 – UEFA B:** Average illumination level shall be measured in accordance with the requirements of the 2023 UEFA Stadium Lighting Guide. Phase 2 lighting calculations must incorporate equipment installed during Phase 1.
- D. As the illumination levels are required not to fall below the specified target values, the Maintained Average Illuminance shall be guaranteed for the applicable warranty period.

PHASE 1

Horizontal Illumination Requirement	Average Target Illumination Levels	Min to Max U1 Uniformity	Min to Ave U2 Uniformity	Grid Spacing	Grid Points
Playing Pitch	> 1,400 lux	0.50	0.70	9.5m x 9.7m	96 Points

Vertical Illumination Requirement	Average Target Illumination Levels	Min to Max U1 Uniformity	Min to Ave U2 Uniformity	Grid Spacing	Grid Points
Main Camera East Stand Gantry	>1,100 lux	0.35	0.45	9.5m x 9.7m	96 Points

PHASE 2 – UEFA B

Horizontal Illumination Requirement	Average Target Illumination Levels	Min to Max U1 Uniformity	Min to Ave U2 Uniformity	Grid Spacing	Grid Points
Playing Pitch	> 1,400 lux	0.50	0.70	9.5m x 9.7m	96 Points

Vertical Illumination Requirement	Average Target Illumination Levels	Min to Max U1 Uniformity	Min to Ave U2 Uniformity	Grid Spacing	Grid Points
Playing Pitch 0° Reference Plane	> 1,000 lux	0.40	0.50	9.5m x 9.7m	96 Points
Playing Pitch 90° Reference Plane	> 1,000 lux	0.40	0.50	9.5m x 9.7m	96 Points
Playing Pitch 180° Reference Plane	> 1,000 lux	0.40	0.50	9.5m x 9.7m	96 Points
Playing Pitch 270° Reference Plane	> 1,000 lux	0.40	0.50	9.5m x 9.7m	96 Points

- E. **Glare Rating:** Lighting design shall include glare rating evaluation across the pitch using the same reference grid as the illuminance levels. Glare rating shall be evaluated at each reference point through 360° at 15° intervals. **Max GR at any point in any viewing direction shall not exceed 45.**
- F. **Column Heights:** Existing columns are 36.6m from the baseplate to the top of the headframe.
- G. **Colour Requirements:** The lighting system shall have a colour temperature between 5,000K – 6,200K and a **minimum** CRI of 80.
- H. The selection of appropriate luminaires shall ensure that the system is efficient, with a high proportion of luminous flux delivered to the pitch surface. A Coefficient of

Utilisation (CU) of at least 65% is required and shall be indicated on the lighting design.

- I. **Hours of usage:** Designs shall be based on the following hours of usage

Area of Lighting	Annual Usage Hours	10 Year Usage Hours	25 Year Usage Hours
Main Playing Pitch	300	3000	7500

- J. The tenderer must submit documentation outlining the LED Lumen Maintenance performance in accordance with TM-21-11 and must comply at a minimum with the below:

- i. L90 hrs is greater than or equal to 120,000 hrs
- ii. L80 hrs is greater than or equal to 120,000 hrs
- iii. L70 hrs is greater than or equal to 120,000 hrs

- K. **Luminaire Protection:** The proposed luminaires must have an ingress rating of IP65 and an impact rating of IK07, or greater.

1.3 ENVIRONMENTAL LIGHT CONTROL

- A. **Light Control Luminaires:** All luminaires shall utilise spill light and glare control devices including, but not limited to, internal shields and optics, louvers, and/or external shields/visors.
- B. **Spill Scans:** Light spill calculations must be submitted indicating the amount of horizontal and vertical lux around the stadium. Calculations shall be submitted on a blanket grid at 10m x 10m intervals out to a 200m radius around the stadium. Contour lines shall be included to indicate the dissipation of light at 10 lux, 5 lux, and 2 lux.
- All spill calculations (horizontal and vertical) shall be measured at 1m above ground level.
- C. To minimise the impact of the lighting installation on the night sky, the luminaires shall be designed using appropriate luminaire aiming and light control cowls/visors to ensure 0% ULR. Documentation must be provided with the tender return to confirm compliance.
- D. The contractor shall ensure that the proposed LED installation does not exceed the parameters of the previous installation and designs which were approved by South Dublin County Council in planning. The Contractor shall be responsible for verifying this and shall provide a statement confirming the same with the tender return.

PART 2 – PRODUCT

2.1 SPORTS LIGHTING SYSTEM CONSTRUCTION

- A. All products must be provided by manufacturers with **FIFA Preferred Provider** certification. Proof of certification must be provided with the tender.
- B. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.
- C. **Durability:** All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanised in accordance with EN1461:2009. All exposed aluminium shall be powder coated with high-performance polyester or anodised. All exterior reflective inserts shall be anodised, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 304 grade or better, passivated and coated with aluminium-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanised meeting EN 1461 (for hot dipped galvanising). All wiring shall be enclosed within the cross-arms, column, or remote electrical enclosure. Any penetrations into existing columns must be completed by a certified welder to meet EN ISO 9606-1 standard or equivalent. Penetrations of existing steel must be treated with zinc galvanising spray.
- D. **Existing Column Weight and Windage Capacity**
 - 1. East Columns – 42 Floodlights Existing
New LED System Allowable Structural Capacity
 - a. 965kg Allowable Headframe Weight (including bracketry)
 - b. 14.48m² Allowable Headframe EPA (including bracketry)
 - 2. West Columns – 62 Floodlights Existing
New LED System Allowable Structural Capacity
 - a. 1,400kg Allowable Headframe Weight (including bracketry)
 - b. 21.32m² Allowable Headframe EPA (including bracketry)
- E. Tendering contractor must provide structural calculations completed by a third-party engineer confirming that the new system will not overload existing columns.
- F. **System Description:** Lighting system shall consist of the following:
 - 1. Galvanised steel cross-arm assembly shall be pre-wired and designed to seamlessly integrate to the existing column mounting plates. No exposed cabling at the top of the column shall be acceptable, all cabling shall be enclosed within the galvanised bracket assembly.
 - 2. Manufacturer/contractor will remotely locate all drivers and supporting electrical equipment in aluminium enclosures mounted approximately 3m above grade – the existing ballast enclosures mounted on the columns shall

be replaced with new pre-wired driver enclosures. Re-use of existing enclosures is not allowed.

The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. An isolator per circuit for each column structure will be located in the enclosure. Drivers mounted integrally to the floodlight or floodlight bracket at the top of the column will not be accepted.

3. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation shall be factory wired and tested.
4. All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.

2.2 ELECTRICAL

- A. Energy Consumption: The connected lighting load for the pitch lighting systems shall not exceed the following:

Project Stage	Maximum kW Consumption
Phase 1	195 kW
Phase 2 - UEFA B	215 kW

2.3 LIGHTING CONTROL

BASE CONTROL SYSTEM

- A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires. Switching capability for either half pitch or full pitch usage. Manual switching to be re-used as currently installed.
- B. System shall be capable of being dimmed to three levels for match and training:
High - 100% / Medium - 50% / Low - 25%

REMOTE DMX CONTROL AND ENTERTAINMENT SYSTEM OPTION:

- C. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires. Manual key switching to be located at a cabinet in an agreed location with Client.
- D. Contactor control of lights: To minimise wear on drivers and other electrical components and prevent lights from turning on due to communication loss, circuits must be controlled via contactor switching rather than by dimming driver output to zero.
- E. Lighting contactor cabinet(s) shall be constructed of aluminium and rated to

IP65, designed for easy installation with contactors, labelled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.

- F. Dimming: System shall provide for custom dimming options via DMX control.
- G. Remote Lighting Control System: System shall allow Client and users with a security code to schedule on/off system operation via a web site, phone, or email up to ten years in advance. Manufacturer shall provide and maintain a 2-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The Client may assign various security levels to schedulers by function. This function must be flexible to allow a range of privileges, from full scheduling capabilities to permission to execute 'early off' commands by phone. The scheduling tool shall be capable of setting curfew limits.

The controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

- H. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).
- I. Management Tools: Manufacturer shall provide a web-based database and dashboard tool for monitoring actual field usage and provide reports by facility and user group. Dashboard shall also show current status of luminaire outages, control operation and service. A mobile application will be provided suitable for iOS and Android devices.

Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the lighting system that is readily accessible to the Client.

 1. Cumulative hours shall be tracked to show the total hours used by the facility.
 2. The system shall report hours saved through the use of early-off commands and push-button controls.
- J. Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring system for duration of system warranty.
- K. Communication with luminaire drivers: Control system shall interface with drivers in electrical component enclosures by means of DMX communication
- L. Entertainment Features: Show controller shall provide preprogrammed light shows / entertainment features and colour changes.

PART 3 – EXECUTION

3.1 FIELD QUALITY CONTROL

- A. **Illumination Measurements:** Upon substantial completion of each phase and in the presence of the Contractor, Project Engineer, Client's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with the UEFA Stadium Lighting Guide.
- B. **Pitch Light Level Accountability**
1. Light levels are guaranteed not to fall below the target maintained light levels for the applicable warranty period.
 2. The Contractor/Manufacturer shall be responsible for an additional inspection one year from the date of commissioning of each phase.
 3. The contractor/manufacturer shall be responsible for all changes necessary to bring the Main Pitch lighting system back into compliance with the specified light levels and uniformities during the applicable warranty period. The contractor/manufacturer shall also be responsible for any damage to the pitch arising from these remedial works.
- C. **Correcting Non-Conformance:** If, in the opinion of the Client or their appointed Representative, the actual performance levels including lux levels and uniformity ratios are not in conformance with the requirements of the performance specification and submitted information, the Manufacturer shall be required to undertake all necessary remedial works to achieve compliance with the specification and satisfy the Client.

3.2 WARRANTY AND GUARANTEE

- A. **10-Year Warranty:** The manufacturer shall provide a signed warranty covering the entire system in accordance with the warranty periods set out below. The warranty shall take effect immediately upon completion of Phase 1 and shall guarantee the specified Phase 1 light levels. Upon completion of Phase 2 – UEFA B, where this occurs within 18 months of completion of Phase 1, the warranty period for the complete lighting system shall recommence for a full 10-year period from the date of completion of Phase 2. Where Phase 2 is completed more than 18 months after completion of Phase 1, the warranty shall be extended to cover the complete lighting system for a 10-year period commencing 18 months after the date of completion of Phase 1. The manufacturer shall maintain specifically funded financial reserves to assure fulfilment of the warranty for the full term. The warranty shall include all parts, access equipment and labour.
- B. Warranty does not cover weather events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorised repairs or alterations, or products manufactured by other manufacturers.
- C. **Maintenance:** The manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for the duration of the Warranty. The manufacturer shall undertake all necessary repairs where a system fault or equipment failure materially impacts use of the Main

Pitch or causes the lighting system to fall below the specified performance criteria. Manufacturer is responsible for removal and replacement of failed luminaires, drivers, or other system components - including all parts, labour, shipping, and access hire associated with maintenance. Client agrees to check fuses in the event of a luminaire outage.

Project Specification Checklist for Tallaght Stadium

Lighting System Manufacturer: _____

Tendering Contractor: _____

1 Lighting Design Requirements: Phase 1 (calculations must be submitted with tender)

- 1.1 Grid points. 96 point Illuminance grid as specified in the UEFA Stadium Lighting Guide 2023.
- 1.2 Guaranteed average illuminance level of >1,400 Lux Eh.
- 1.3 Guaranteed average vertical Illuminance level of >1,100 lux to the main camera.
- 1.4 Horizontal Minimum to Average uniformity of greater than 0.70 and Minimum to Maximum of greater than 0.50.
- 1.5 Vertical Minimum to Average uniformity of greater than 0.45 and Minimum to Maximum of greater than 0.35.
- 1.6 Max glare rating across all calculation points must not exceed 45 assessed in all directions.
- 1.7 Design efficiency meets or exceeds 65% efficiency as indicated in the form of Coefficient of Utilisation (CU).

2 Lighting Design Requirements: Phase 2 - UEFA B (calculations must be submitted with tender)

- 2.1 Grid points. 96 point Illuminance grid as specified in the UEFA Stadium Lighting Guide 2023.
- 2.2 Guaranteed average illuminance level of >1,400 Lux Eh.
- 2.3 Guaranteed average vertical Illuminance level of >1,000 lux average on all four reference planes.
- 2.4 Horizontal Minimum to Average uniformity of greater than 0.70 and Minimum to Maximum of greater than 0.50.
- 2.5 Vertical Minimum to Average uniformity of greater than 0.50 and Minimum to Maximum of greater than 0.40.
- 2.6 Max glare rating across all calculation points must not exceed 45 assessed in all directions.
- 2.7 Design efficiency meets or exceeds 65% efficiency as indicated in the form of Coefficient of Utilisation (CU).

3 Energy Efficiency Requirements and Evaluation

- 3.1 The maximum connected lighting load shall not exceed 195 kW for Phase 1 and 215 kW for Phase 2 – UEFA B. A Life-Cycle Cost Analysis has been completed and submitted for review.
- 3.2 The system shall provide High/Medium/Low dimming functionality, with an option provided for the Advanced DMX Control System.

4 LED System Performance

- 4.1 The L90, L80, L70 values shall all be equal to or greater than 120,000 hours.
- 4.2 Evidence supporting the above-mentioned lumen maintenance values must be submitted in accordance with TM-21-11.
- 4.3 All drivers must be remotely located from the LED floodlight in a location accessible without the need for high level access machinery. Floodlights with the driver mounted integrally to the floodlight are not acceptable.
- 4.4 The luminaire must have an ingress protection (IP) rating of 65 and an impact rating of IK07 or greater.
- 4.5 The LED package shall have a colour temperature between 5,000K and 6,200K.
- 4.6 The LED package shall have a minimum CRI value of 80.
- 4.7 All Components shall be designed and manufactured to work as a system. All luminaires, drivers, and enclosures must be factory assembled, aimed, wired and tested.

5 Spill and Glare Control

- 5.1 Light spill (horizontal and vertical lux) calculations have been provided that comply with Section 1.3 (Environmental Light Control). The tenderer has submitted appropriate data to satisfy the consultant/Client of the spill and glare control mechanisms of the luminaires, particularly the roof-mounted luminaires, together with a relevant case study example.
- 5.2 In accordance with the ILP Guidance, sky glow shall be minimised through appropriate luminaire aiming and light control measures. A design calculation indicating a ULR of 0% must be provided.

6 Warranty and Guarantees

- 6.1 A full parts and labour warranty complying with the requirements of Section 3.2 (Page 9) has been included, covering the entire lighting system, including access equipment and any annual cleaning required by the manufacturer.
- 6.2 The lighting performance shall be guaranteed for the applicable warranty periods specified in Section 3.2 (Page 9). Should the lighting performance fall below the applicable values stated in the tender

specification during these periods, the manufacturer shall rectify the system at no cost to the Client.

- 6.3 The manufacturer shall cover all parts, labour, shipping and access equipment costs required to rectify issues with the lighting system and maintain the guaranteed light levels throughout the applicable warranty periods specified in Section 3.2 (Page 9).
- 6.4 A warranty document shall be submitted with the tender demonstrating compliance with Section 3.2 (Page 9). The warranty shall be issued and backed by the manufacturer of the lighting system.

7 Experience

- 7.1 A minimum of three suitable references completed shall be provided for football stadium projects of similar scope and performance, for professional/high-performance use at UEFA Level B or above and installed by the tendering Contractor. Contact details shall be provided for the ultimate end user/Client. Video references shall also be provided demonstrating competence and capability in the delivery of advanced DMX-based lighting control systems in a stadium environment.